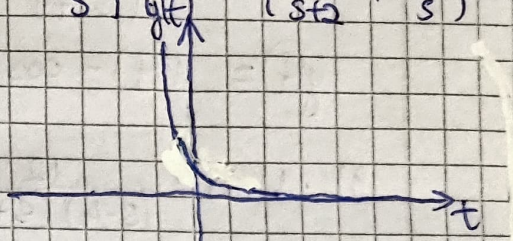
5) $H(s) = \frac{3s}{s+2}$

$y(t) = 3\mathcal{L}^{-1}\left\{\frac{s}{s+2}\cdot\frac{1}{s}\right\} = \left(3\mathcal{L}^{-1}\left\{\frac{R_1}{s+2} + \frac{R_2}{s}\right\} = 3\mathcal{L}^{-1}\left\{\frac{-\frac{1}{2}}{s+2} + \frac{\frac{1}{2}}{s}\right\} =\right.$

$R_1 = \lim_{s\to -2} \frac{1}{s} = -\frac{1}{2} = -0{,}5$

$R_2 = \lim_{s\to 0} \frac{1}{s+2} = \frac{1}{2}$



$\left. = 3\mathcal{L}^{-1}\left\{-\frac{1}{2s+4} + \frac{1}{2s}\right\} = \frac{3}{2}\mathcal{L}^{-1}\left\{-\frac{1}{s+2} + \frac{1}{s}\right\} = \frac{3}{2}\cdot(e^{-2t} + 1(t))\right)$

$y(t) = 3\mathcal{L}^{-1}\left\{\frac{s}{s+2}\cdot\frac{1}{s}\right\} = 3\cdot\mathcal{L}^{-1}\left\{\frac{1}{s+2}\right\} = 3\cdot e^{-2t}$

6) $H(s) = \frac{21}{s(s+7)}$

$y(t) = \mathcal{L}^{-1}\left\{\frac{21}{s(s+7)}\cdot\frac{1}{s}\right\} = 21\mathcal{L}^{-1}\left\{\frac{R_1}{s^2} + \frac{R_2}{s+7} + \frac{R_3}{s}\right\}$

$R_1 = \lim_{s\to 0} \frac{1}{s+7} = \frac{1}{7}$

$R_2 = \lim_{s\to -7} \frac{1}{s^2} = \frac{1}{49}$

$(s+7)R_1 + s^2R_2 + sR_3(s+7) = 1$

$s^2(R_2+R_3) + s(R_1+7R_3) + 7R_1 = 1$

$\Rightarrow \begin{cases} R_2+R_3 = 0 \\ R_1+7R_3 = 0 \end{cases} \Rightarrow R_3 = -\frac{1}{49}$

$\Rightarrow y(t) = 21\mathcal{L}^{-1}\left\{\frac{1}{7s^2} + \frac{1}{49(s+7)} - \frac{1}{49s}\right\} = 3t + \frac{3}{7}e^{-7t} - \frac{3}{7}$

$$\mathcal{L}^{-1}\left\{\frac{a}{s(s^2+a^2)}\right\} = \frac{1}{a}(u(t)-\cos at)$$

8) $H(s) = \frac{9}{s^2+9}$

$$y(t) = \mathcal{L}^{-1}\left\{\frac{9}{s^2+9}\cdot\frac{1}{s}\right\} = 3\mathcal{L}^{-1}\left\{\frac{3}{s(s^2+3^2)}\right\} = 3\cdot\frac{1}{3}(1(t)-\cos(3t))$$

$$y(t) = 1(t) - \cos(3t)$$

9) $H(s) = \frac{12}{(s-4)(s+2)}$

$$y(s) = \mathcal{L}^{-1}\left\{\frac{12}{(s-4)(s+2)}\cdot\frac{1}{s}\right\} = 12\mathcal{L}^{-1}\left\{\frac{R_1}{s-4}+\frac{R_2}{s+2}+\frac{R_3}{s}\right\}$$

$$R_1 = \lim_{s\to 4}\frac{1}{(s+2)s} = \frac{1}{24}$$

$$R_2 = \lim_{s\to -2}\frac{1}{(s-4)s} = \frac{1}{12}$$

$$R_3 = \lim_{s\to 0}\frac{1}{(s-4)(s+2)} = -\frac{1}{8}$$

$$\Rightarrow y(t) = 12\,\mathcal{L}^{-1}\left\{\frac{1}{24}\cdot\frac{1}{s-4}+\frac{1}{12}\cdot\frac{1}{s+2}+\left(-\frac{1}{8}\right)\cdot\frac{1}{s}\right\}$$

$$= \frac{1}{2}e^{4t} + e^{-2t} - \frac{3}{2}$$

10) $H(s) = \frac{12}{s^2-4}$

$$y(t) = \mathcal{L}^{-1}\left\{\frac{12}{s^2-4}\cdot\frac{1}{s}\right\} = 12\,\mathcal{L}^{-1}\left\{\frac{R_1}{s+2}+\frac{R_2}{s-2}+\frac{R_3}{s}\right\}$$

$$R_1 = \lim_{s\to -2}\frac{1}{(s-2)s} = \frac{1}{8}$$

$$R_2 = \lim_{s\to 2}\frac{1}{(s+2)s} = \frac{1}{8}$$

$$R_3 = \lim_{s\to 0}\frac{1}{(s+2)(s-2)} = -\frac{1}{4}$$

$$y(t) = 12\cdot\mathcal{L}^{-1}\left\{\frac{1}{8}\cdot\frac{1}{s+2}+\frac{1}{8}\cdot\frac{1}{s-2}-\frac{1}{4}\cdot\frac{1}{s}\right\}$$

$$= -\frac{3}{2}e^{-2t} + \frac{3}{2}e^{-t} + 3$$